Botrychium dissectum from Minnesota

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In the spring of 1930 I wrote to Prof. F. K. Butters, of the University of Minnesota, asking him if the University herbarium contained any specimens of *Botrychium dissectum* or *Botrychium obliquum*, and about how many had been found in the state. He replied that their herbarium contained no specimen of *B. dissectum*, and while it had several sheets labeled *B. obliquum*, he felt that they were not determined correctly, and that they were in reality *B. ternatum* var. *intermedium*. Prof. Butters offered to lend me the specimens for my study. I accepted the offer, and after carefully looking them over, I decided that Prof. Butters was correct in his decision.

Shortly after I had returned the University specimens, Prof. Butters wrote me that Dr. Rosendahl had returned from the field with a plant of *Botrychium dissectum*, which he had collected in Rice County, Minnesota, 5 miles east of Faribault. He stated that it was a large plant but not fruiting and entirely typical. One statement that interested me was that he saw no other Botrychiums in the vicinity. This is one more point in favor of my theory that *B. dissectum* is a valid species. I believe that the Minnesota plant grew from spores of *B. dissectum* that had been carried there, perhaps in soil on the feet of birds.

The *Botrychium dissectum* station here at Bentonsport, Iowa, that I located in 1926, containing 31 plants, has continued to thrive and produce only *B. dissectum* plants. In the four years I have had it under observation no plants of *B. obliquum* have appeared at the station. Several small plants have come up at different times but all have developed into *B. dissectum* plants.

In 1926 one plant fruited and cast its spores. In the fall of 1927 about a dozen and a half young plants appeared, and those that survived now show that they are all *B. dissectum*. I counted 48 plants late in 1927. In 1928 I counted 51 plants. In 1929 there were only 38 plants, but that was due perhaps to the fact that the station had been disturbed by children. This year, 1930, I counted only 33 plants but this has been one of the driest summers Iowa has experienced for many years. I noticed two plants drying up in August, and the drouth was perhaps responsible for the decrease in number this year.

In 1928 I made a trip to St. Louis, Missouri, and called at the herbarium of the Missouri Botanical Garden. I obtained permission of Dr. Greenman, who has charge of the herbarium, to look over the Botrychiums deposited there. I found *B. dissectum* was represented by only four sheets from west of the Mississippi River. Two sheets by H. Eggert, from St. Louis County, were collected Sept., 1887. One sheet, by G. W. Letterman, was from Allerton, Missouri, a large specimen. One sheet, by Colton Russel, from Annapolis, Mo., collected Sept., 1900, growing with ternatum. I suppose he meant *B. obliquum*, as *B. ternatum* does not usually occur this far south. This is the only station that mentions *B. dissectum* growing with *B. obliquum* west of the Mississippi River. East of the river it grows quite commonly with *B. obliquum*. There were two other sheets that were of special interest to me. One, of two specimens of *B. dissectum*, was collected by Miss Sadie Price, at Chipley, Florida, in 1896. One sheet of four specimens was by Eaton, from Cades Cove, Tennessee. Cades Cove is about twenty miles southeast of Knoxville. I made a statement in Vol. 17, page 18, that I knew of no *B. dissectum* being collected south of the 36th parallel; this is to correct that statement.

Recently I wrote to Dr. W. N. Steil, of the University of Wisconsin, asking him if *B. dissectum* grew in Wisconsin, and he replied he has never known of a single plant being found there. I have in my possession the specimens of the *B. ternatum* group from the Public Museum of Milwaukee, and I found no *B. dissectum* in the material. Strange as it may appear, *B. obliquum* is represented by only one specimen. Strange also that *B. dissectum* has not been found there. West of the Mississippi River Minnesota has one station, Iowa has one and Missouri has three. All of these stations are about the same distance west of the Mississippi River, that is, around fifty miles. As the Mississippi River bears to the east in its course southward it makes the station at Faribault, Minnesota, the farthest west of all the stations. The Missouri stations are near the 91st meridian, the Iowa station is on the 92nd, the Minnesota station is just west of the 93rd.

More than a year ago I wrote Mr. E. J. Palmer, who has done considerable collecting in the Mississippi River valley region, asking him if he had found *B. dissectum* west of the river. His reply was that he had not, but that in Illinois he had found it quite commonly, but always with *B. obliquum.*

It has always been a question with me why *B. dissectum* usually grows with *B. obliquum.*

There is a theory that has been advanced that Botrychium spores are dependent on symbiotic fungus for germination. To prove whether this theory holds good or not I have been making some experiments in sowing *B. dissectum* and *B. obliquum* spores. The first two or three years I sowed the spores without inoculating the soil, and I have failed to get them to grow. Now I am doing it differently. I sow spores of *B. dissectum* on soil inoculated from the parent station. I have also tried

sowing *B. obliquum* spores on soil from the parent station. Then I sowed *B. dissectum* spores on soil from the *B. obliquum* station and *vice versa.* The result is yet to be obtained. The idea came to me that perhaps *B. dissectum* will grow with the same bacteria from either station. It that be true then we might be able to solve the problem why *B. dissectum* and *B. obliquum* are usually found growing together. Undoubtedly neither *B. obliquum* nor *B. dissectum* grow well with *B. ternatum* var. *intermedium*, else we would find them growing in Wisconsin and Minnesota more plentifully. This will be taken up more fully in another paper I am preparing on the Botrychiums of the Mississippi River valley region.

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Recent Fern Literature

Ching, R. C., "The Studies of Chinese Ferns—I," contribution from the Metropolitan Museum of Natural History, Academia Sinica I: p. 43–46, pl. 1–7, April, 1930.

This paper, "The Studies of Chinese Ferns—I," is published as the first of a series designed to present a record of new or little understood fern species in China. Mr. Ching describes new species in *Cyrtomium, Polypodium, Coniogramme, Diplazium, Adiantum, Lindsaya* and *Elaphoglossum*, and discusses a considerable number of other forms about which there has been some uncertainty of identification. He reports in addition, as footnotes, two interesting facts. First, for five years he has been engaged on a "Monograph of Chinese Ferns" which he expects to have completed in the near future. Second, he makes known that Dr. Christensen is working on the preparation of a list of the known species of Chinese ferns.